

WHAT IS CLAIMED IS:

1 1. A method of detecting in a sample a β -tubulin isotype modified at
2 cysteine residue 239, the method comprising the steps of:

3 (a) providing a sample treated with a β -tubulin modifying agent;

4 (b) contacting the sample with an antibody that specifically binds to a β -
5 tubulin isotype modified at cysteine residue 239; and

6 (c) determining whether the sample contains a modified β -tubulin isotype
7 by detecting the antibody.

1 2. The method of claim 1, wherein the antibody is a monoclonal
2 antibody.

1 3. The method of claim 2, wherein the antibody is selected from the
2 group consisting of 1F6D8, 1B2C11, 3A1C11, 2C1H7, 3F2A4, 5F5C11, and 6D4D11.

1 4. The method of claim 1, further comprising the step of using a
2 control antibody that recognizes both modified and unmodified β -tubulins.

1 5. The method of claim 4, wherein the control antibody is a
2 monoclonal antibody selected from the group consisting of 3D12D1, 4B6G6, 5F1D4,
3 6H8E3, AND 6H10C7.

1 6. The method of claim 1, further comprising the step of using a
2 control antibody that recognizes only unmodified β -tubulins.

1 7. The method of claim 6, wherein the control antibody is a
2 monoclonal antibody selected from the group consisting of 3E10A3, 6A7F9, and 6E7G1.

1 8. The method of claim 1, wherein the step of determining whether
2 the sample contains a modified β -tubulin isotype comprises detecting the antibody in an
3 assay selected from the group consisting of an ELISA assay, a western blot, an
4 immunohistochemical assay, an immunofluorescence assay, and a real time imaging
5 assay.

1 9. The method of claim 1, wherein the step of determining whether
2 the sample contains a modified β -tubulin isotype further comprises quantitating the
3 amount of modified β -tubulin isotype in the sample.

1 10. The method of claim 1, wherein the antibody is bound to a solid
2 substrate.

1 11. The method of claim 1, wherein the sample is selected from the
2 group consisting of an *in vitro* tubulin polymerization reaction sample, a cultured cell,
3 and a patient sample.

1 12. The method of claim 11, wherein the patient sample is a blood
2 sample.

1 13. The method of claim 11, wherein the patient sample is from a
2 cancer patient receiving pentafluorobenzenesulfonamide chemotherapy.

1 14. The method of claim 11, wherein the patient sample is from a
2 cancer patient receiving 2-fluoro-1-methoxy-4-pentafluorophenylsulfonamidobenzene
3 chemotherapy.

1 15. The method of claim 11, wherein the patient sample is from a
2 human patient.

1 16. The method of claim 1, wherein the antibody is covalently linked
2 to a detectable moiety.

1 17. The method of claim 16, wherein the antibody is covalently linked
2 to a biotin moiety, an iodine moiety, or an enzyme moiety.

1 18. A monoclonal antibody that specifically binds to a β -tubulin
2 isotype modified at cysteine residue 239, the antibody selected from the group consisting
3 of 1F6D8, 1B2C11, 3A1C11, 2C1H7, 3F2A4, 5F5C11, and 6D4D11.

1 19. The monoclonal antibody of claim 18, wherein the antibody is
2 covalently linked to a detectable moiety.

1 20. The monoclonal antibody of claim 19, wherein the antibody is
2 covalently linked to a biotin moiety, an iodine moiety, or an enzyme moiety.

1 21. A method of monitoring the amount of modified β -tubulin isotype
2 in a patient treated with an agent that modifies cysteine residue 239 in a β -tubulin isotype,
3 the method comprising the steps of:

4 (a) providing a sample from the patient treated with the β -tubulin
5 modifying agent;

6 (b) contacting the sample with an antibody that specifically binds to a
7 modified β -tubulin isotype; and

8 (c) determining the amount of modified β -tubulin isotype in the patient
9 sample by detecting the antibody and comparing the amount of antibody detected in the
10 patient sample to a standard curve, thereby monitoring the amount of modified β -tubulin
11 isotype in the patient.

1 22. The method of claim 21, further comprising the step of adjusting
2 the dose of the β -tubulin modifying agent administered to the patient.

1 23. The method of claim 21, wherein the agent is a
2 pentafluorobenzenesulfonamide.

1 24. The method of claim 21, wherein the agent is 2-fluoro-1-methoxy-
2 4-pentafluorophenylsulfonamidobenzene.

1 25. The method of claim 21, wherein the sample is a blood sample.

1 26. The method of claim 21, wherein the antibody is a monoclonal
2 antibody.

1 27. The method of claim 26, wherein the monoclonal antibody is
2 selected from the group consisting of 1F6D8, 1B2C11, 3A1C11, 2C1H7, 3F2A4,
3 5F5C11, and 6D4D11.

1 28. The method of claim 21, wherein the antibody is covalently linked
2 to a detectable moiety.

1 29. The method of claim 28, wherein the antibody is covalently linked
2 to a biotin moiety, an iodine moiety, or an enzyme moiety.

1 30. The method of claim 21, wherein the antibody is bound to a solid
2 substrate.

1 31. A method of isolating a β -tubulin isotype modified at cysteine
2 residue 239, the method comprising the steps of:

- 3 (a) providing a sample treated with a β -tubulin modifying agent;
4 (b) contacting the sample with an antibody that specifically binds to a
5 modified β -tubulin isotype; and
6 (c) isolating the modified β -tubulin isotype by isolating the antibody.

1 32. The method of claim 31, wherein the antibody is a monoclonal
2 antibody.

1 33. The method of claim 32, wherein the monoclonal antibody is
2 selected from the group consisting of 1F6D8, 1B2C11, 3A1C11, 2C1H7, 3F2A4,
3 5F5C11, and 6D4D11.

1 34. The method of claim 31, wherein the antibody is covalently linked
2 to a biotin moiety, an iodine moiety, or an enzyme moiety.

1 35. The method of claim 33, wherein the antibody is covalently linked
2 to a biotin moiety, an iodine moiety, or an enzyme moiety.

1 36. The method of claim 31, wherein the antibody is bound to a solid
2 substrate.

1 37. A method of detecting an antibody that specifically binds to β -
2 tubulin modified at cysteine residue 239, the method comprising the steps of:

- 3 (a) providing a sample;
4 (b) contacting the sample with a peptide that specifically binds to the
5 antibody; and
6 (c) detecting the antibody.

1 38. The method of claim 37, wherein the peptide is
2 ATMSGVTTCLRFPGLNA, GTMECVTTCLRFPGLNA, or
3 KATMSGVTTCLRFPGLNA.

1 39. The method of claim 37, wherein the step of detecting the antibody
2 comprises an ELISA assay.

1 40. The method of claim 37, wherein the peptide is bound to a solid
2 substrate.

1 41. A method of detecting in a sample a modified tubulin, the method
2 comprising the steps of:

- 3 (a) providing a sample treated with a tubulin modifying agent;
4 (b) contacting the sample with an antibody that specifically binds to a
5 modified tubulin isotype; and
6 (c) determining whether the sample contains a modified tubulin by
7 detecting the antibody.

1 42. A method of monitoring the amount of modified tubulin in a
2 patient treated with an agent that modifies tubulin, the method comprising the steps of:

- 3 (a) providing a sample from the patient treated with the tubulin modifying
4 agent;
5 (b) contacting the sample with an antibody that specifically binds to a
6 modified tubulin; and
7 (c) determining the amount of modified tubulin in the patient sample by
8 detecting the antibody and comparing the amount of antibody detected in the patient
9 sample to a standard curve, thereby monitoring the amount of modified tubulin in the
10 patient.